

DETAILED ACTION

Response to Amendment

No amendment has been made to any of the pending claims. No claim has been canceled. No new claim has been added. Thus, claims 10-21 currently remain pending in this application.

Maintained Rejection

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

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under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 10-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 96/33150 (hereinafter "WO") in view of U.S. Patent 4,739,124 to Ward (hereinafter "Ward").

The WO reference discloses a process for converting alkane to alkene comprising (a) contacting alkane with a dehydrogenation catalyst under conditions sufficient to produce alkene and hydrogen, wherein the dehydrogenation catalyst comprises at least one metal selected from Cr, Mo, Ga, Zn and a Group VIII metal; (b) contacting the effluent from step (a) with an oxidation catalyst and oxygen under conditions sufficient to selectively convert the hydrogen to water, wherein the oxidation catalyst comprises an oxide of at least one metal selected from Bi, In, Sb, Zn, Tl, Pb and Te; and (c) contacting at least a portion of the effluent of step (b) with a solid material comprising a dehydrogenation catalyst under conditions sufficient to convert unreacted alkane to additional quantities of alkene and hydrogen (page 4, line 18 to page 5, line 2; page 8, lines 5-19; and Figures 1 and 2).

WO fails to disclose adding liquid water to the effluent of step (a).

Ward discloses a dehydrogenation process comprising passing a feed stream admixed with superheated steam into a first dehydrogenation zone to produce an effluent stream; the effluent stream is cooled and admixed with an oxygen-containing

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gas stream; passing the effluent stream into a separate bed of hydrogen selective oxidation catalyst and producing an oxidation effluent stream; passing the oxidation zone effluent stream through a second bed of dehydrogenation catalyst to produce a second dehydrogenation effluent (col. 2, lines 45-63; col. 7, line 12 thru col. 8, line 39; and col. 9, lines 30-50). The cooling of the dehydrogenation effluent provides for increased in conversion (col. 5, lines 5-48). Ward discloses that the cooling of the dehydrogenation effluent may be performed by indirect, direct, or a combination thereof in which the effluent is mixed with a low temperature cooling media, i.e., water, which may be a gas or a liquid phase stream (col. 6, lines 1-25).

Thus, it would have been obvious to one skilled in the art to modify the WO reference by cooling the dehydrogenation effluent as disclosed by Ward for an enhanced conversion. It would, also, have been obvious to add water and/or water vapor in the direct cooling step as, also, disclosed by Ward (col. 6, lines 1-25).

With regard to the claimed dehydrogenation catalyst comprising Pt and Sn on an aluminate carrier, WO discloses a dehydrogenation catalyst comprising a supported Group VIII metal, i.e., Pt/Sn/ZSM-5 (page 6, line 35 to page 7, line 18).

Response to Arguments

Applicant's arguments filed 9/10/2009 have been fully considered but they are not persuasive.

Applicant argues that Ward "does not disclose a method for selecting an optimized cooling method prior to the oxidative heating..." (Remarks, page 7, 1st

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paragraph) The argument is not persuasive because Ward recognizes criticality of cooling the effluent stream of the dehydrogenation zone prior to its passage into the downstream bed of oxidation catalyst (col. 5, lines 22-51). Ward goes disclose, "There are many ways in which the cooling step of the subject process may be performed. The cooling step may be performed by direct heat exchange in which the effluent of the dehydrogenation zone is admixed with a low temperature cooling media which may be a gas or a liquid phase stream." (See col. 6, lines 1-6) Thus, there is a suggestion to employ a combination of steam and water to cool the dehydrogenation effluent stream.

Applicant argues that "neither of the applied references ... teach the further optimization obtained in that the oxidation and further dehydrogenation may take place in the same catalyst bed and possibly over the same catalyst ..." (Remarks, page 8, 4th paragraph) The argument is not persuasive because it has been held that generally, no invention is involved in the broad concept of performing simultaneously operations which have previously been performed in sequence. *In re Tatincloux*, 108 USPQ 125.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IN SUK BULLOCK whose telephone number is (571)272-5954. The examiner can normally be reached on Monday - Friday 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Calderola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/In Suk Bullock/
Primary Examiner, Art Unit 1797